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Chinese bees of the genus *Pachyhalictus* (Hymenoptera: Halictidae)

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The genus *Pachyhalictus* is represented by seven species in the fauna of China. All the species belong to the subgenus *Pachyhalictus*. Of them, *P. lioscutalis*, *P. trachynus*, and *P. yunnanicus* are described as new, the other species are recorded from China for the first time. *Halictus validus* Bingham, 1903 is shown to be a junior synonym of *Pachyhalictus intricatus* (Vachal, 1894). The hitherto unknown male of the latter species is described.

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Introduction

The name *Pachyhalictus* was given by Cockerell (1929: 589) as a subgeneric one (in the genus *Halictus*) for the species group "Halicti nomiiformes" by Vachal (1894: 428). *Halictus merescens* Cockerell, 1919, from Philippines, was designated by Cockerell (1929) as the type species of the subgenus. Michener (1978) regarded *Pachyhalictus* as a separate genus consisting on two subgenera: Afrotropical *Dictyohalictus* Michener, 1978, and Indoaustralian *Pachyhalictus* s. str. Of the 32 known species of the latter subgenus (including also three new species described below), 31 species inhabit the Oriental Region and only *P. stirlingi* (Cockerell) is distributed in northern Australia.

The genus *Pachyhalictus* belongs to the halictines with "strong venation" (subtribe Halictina). Although the genus possesses a number of synapomorphies (e. g. peculiar vestiture of the hind tibiae of female and very robust body), it can be considered as close to the hypothetical form intermediate between Halictina and the halictines with "weak venation" (subtribe Gastrohalictina) or to the nearest common ancestor of the tribe Halictini, because of developed anterior tomentum bands on metasomal terga, large ventral metasomal scopa of female,

generalized structure of the male genitalia, etc. The Palaeotropical range of the genus *Pachyhalictus* also corroborates the hypothesis of its relative antiquity.

The nominotypical subgenus, to which all Chinese species of the genus *Pachyhalictus* belong, differs from the subgenus *Dictyohalictus* in the coarsely pectinate inner metatibial spurs of female, reduced basimetatibial plate of male, and fused first two metatarsal segments of male. In the Oriental Region, the genus *Pachyhalictus* is represented by very rare and poorly known forms. In fact, they not have been investigated since the revision by Blüthgen (1926, 1928, 1931), who studied only about hundred specimens (including almost all types and material of previous authors). Up to now no representatives of the genus were known from continental China, though one species, *P. formosicola* (Blüthgen), was recorded from Taiwan.

The present paper is based on examination of 13 specimens kept in the Institute of Zoology, Academia Sinica, Beijing (IZB) and 15 specimens collected by participants of the Soviet-Chinese Expedition (1955-1958) in Yunnan Prov. and preserved in the Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZISP). Seven species are found in this material, including three new ones. These new species (*P. lioscutalis*, *P. trachynus*,

and *P. yunnanicus*) and the hitherto unknown male of *P. intricatus* (Vachal) are described below. *Halictus validus* Bingham, 1903 is shown to be a junior synonym of *H. intricatus* Vachal, 1894. Four species are indicated for the first time for continental China.

Pachyhalictus (Pachyhalictus) liodomus (Vachal)

Halictus liodomus Vachal, 1894: 435, ♀, Burma; Blüthgen, 1926: 403 (in key to females), 422 (distribution).
Halictus scopipes Friese, 1918: 499, ♀, Java; synonymized by Blüthgen (1926: 422).
Pachyhalictus (Pachyhalictus) liodomus: Michener, 1978: 518.

Material. **China**, Yunnan Prov., Xishuangbanna Distr., Mengxong, 750 m, 9.VI.1958, leg. Meng Shu-wu, 1 ♀ [IZB].

Taxonomic note. This female differs slightly from the type and the diagnosis by Blüthgen (1926: 403) in the paler tarsal segments 2-4, darker antenna, and slightly smaller body.

Distribution. North-eastern India, Burma, Java, Sumatra; new for China (Yunnan).

Pachyhalictus (Pachyhalictus) formosicola (Blüthgen)

Halictus formosicola Blüthgen, 1926: 409 (in key to females), 413 (in key to females), 425 (type material), Pl. 4, Figs. 26, 27, ♀, Taiwan; Blüthgen, 1931: 288 (*Halictus* subg. *Pachyhalictus*, in key to females).

Pachyhalictus (Pachyhalictus) formosicola: Michener, 1978: 518.

Material. **China**, Yunnan Prov., Xishuangbanna Distr.: Xiaomengyan, 850 m, 14.VII.1957, leg. Zan Ling-chao, 2 ♀; Yunjinghong, 910-950 m, 25.VI.1958, leg. Zhang Yi-ren, 1 ♀; 17.IV.1982, leg. He Wan, 1 ♀. [All in IZB].

Taxonomic note. These females differ slightly from the original description in the coloration of the scutum and scutellum which are black, without slight bronze tint.

Distribution. Taiwan; new for continental China (Yunnan).

Pachyhalictus (Pachyhalictus) reticulosus (Dalla-Torre)

Halictus reticulatus Vachal, 1894: 434, ♀, ♂, Burma; nec *H. reticulatus* Robertson, 1892.

Halictus reticulosus Dalla-Torre, 1896: 80, nom. n.; Blüthgen, 1926: 413 (in key to females); Blüthgen, 1928: 343 (redescription of male), 345 (in key to males), Fig. 1.

Pachyhalictus (Pachyhalictus) reticulosus: Michener, 1978: 518.

Material. **China**, Yunnan Prov.: Ganlanba, 540-700 m, 16.IV.1957, leg. Lyu Da-chua and Pu Fu-di, 2 ♀ [ZISP]; Xishuangbanna Distr., Xiaomengyan, 850 m, 8.IX.1958, leg. Wan Shu-yong, 1 ♀ [IZB].

Taxonomic note. These females differ from the diagnosis by Blüthgen (1926: 413) in the better developed vestiture of metasomal terga 2-4 (similar to *P. puangensis* (Cockerell) from Thailand): long, thick, inclined, moderately dense, dark brown hairs on post-gradular area; moderately long, dense yellowish hairs on posterior marginal area.

Distribution. Northern India, Burma, Indonesia (Pahang); new for China (Yunnan).

Pachyhalictus (Pachyhalictus) intricatus (Vachal)

(Figs 1-14)

Halictus intricatus Vachal, 1894: 433, ♀, Burma; Blüthgen, 1926: 405 (in key to females), 422 (distribution), Pl. IV, Figs. 23-25; Blüthgen, 1931: 405 (*Halictus* subg. *Pachyhalictus*, in key to females).

Halictus validus Bingham, 1903: V, ♀, Thailand; Blüthgen, 1926: 429 (taxonomic note); Blüthgen, 1931: 286 (*Halictus* subg. *Pachyhalictus*, diagnosis), 288 (possible status). **Syn. n.**

Halictus thoracicus Friese, 1914: 22, ♀, Java. Synonymized by Blüthgen (1926: 422).

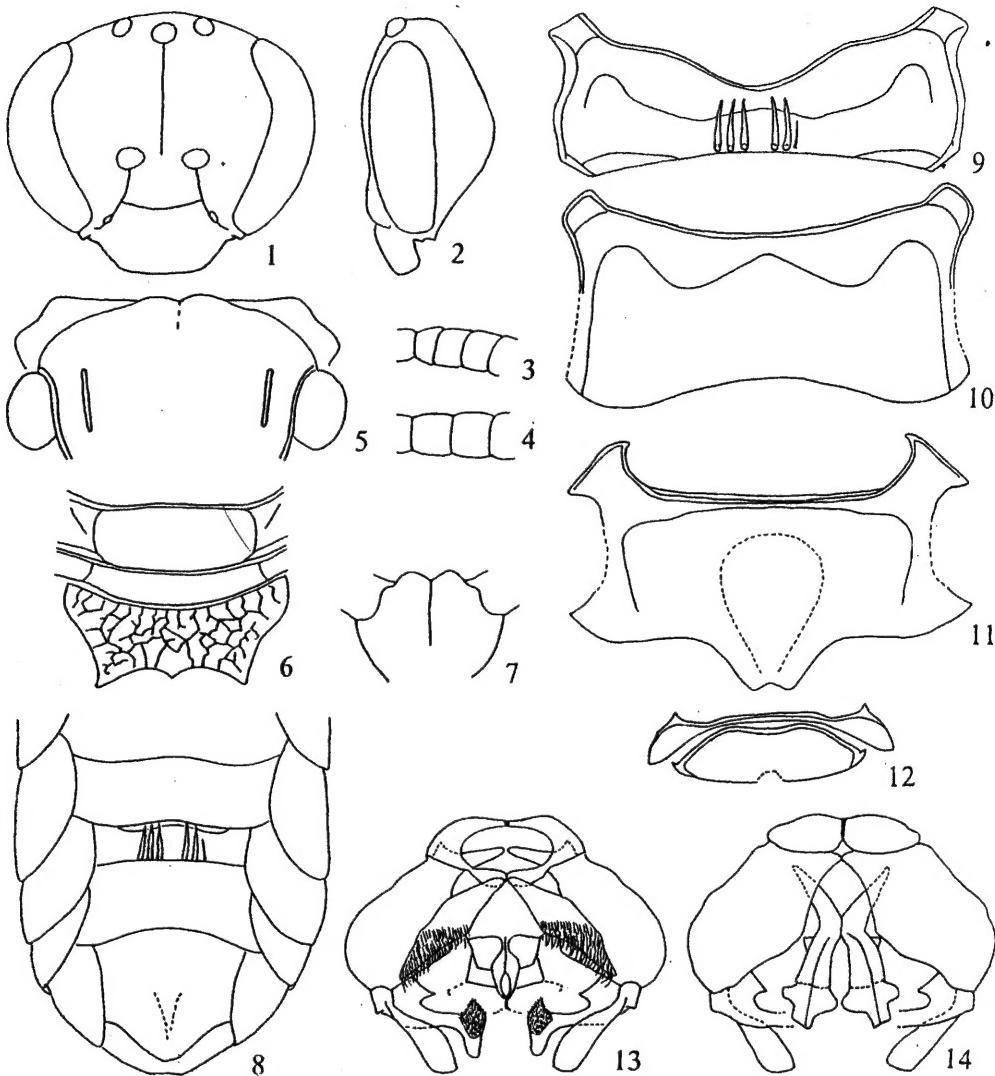
Pachyhalictus (Pachyhalictus) intricatus: Michener, 1978: 512.

Material. **China**, Yunnan Prov.: Jinggu, 930 m, 23.IV.1955, leg. V. Popov, 1 ♀; same locality and date, leg. Xyue Yu-fyng, 1 ♂; 30 km SW Jingping, 500 m, 20.IV.1956, leg. Huan Ke-ren, 1 ♀; 18 km N Jingdang, 1250 m, 21.V.1956, leg. V. Popov, 1 ♀; Xiaomengyang, 950 m, 5.V.1957, leg. Zan Ling-chao, 1 ♀. [All in ZISP].

Synonymical remarks. Blüthgen (1931: 286, 288) examined the type of *H. validus* and noticed that (1) it differs from *H. intricatus* only in the densely roughened horizontal part of metasomal tergum I before its posterior marginal area and (2) it is possibly only a variety of *H. intricatus*. The sculpture of tergum I in four females examined by us varies from shining, almost polished (1 ♀), through weakly shining (intermediate condition, 1 ♀) to dull, conspicuously roughened (2 ♀).

Taxonomic note. The females examined differ slightly from the types of *H. intricatus* and diagnoses by Blüthgen (1926, 1931) in coarser sculpture of frons.

Description of male (new). Structure. Length 6.5 mm. Head flattened (Fig. 2), shortly triangularly rounded in frontal view; its height/width ratio 0.85 (Fig. 1). Vertex moderately convex; lateral ocelli lying immedi-



Figs 1-14. *Pachyhalictus intricatus* (Vachal), male. 1, head in frontal view; 2, head in lateral view; 3, flagellomeres 1-3; 4, flagellomeres 5 and 6; 5, pronotal ridges and scutum in dorsal view; 6, scutellum, metanotum and dorsal surface of propodeum; 7, posterior vertical surface of propodeum; 8, metasoma in ventral view; 9, metasomal sternum 4; 10, sternum 5; 11, sternum 6; 12, sterna 7 and 8; 13, genital capsule in ventral view (distal part of penis valvae is not shown); 14, genital capsule in dorsal view (distal part of dorsal lobe of gonostyli is not shown).

ately under line formed by upper margin of vertex. Malar space linear. Clypeus weakly convex; its height/width ratio 0.45. Supraclypeal area weakly convex, but strongly projecting above paraocular areas. Frontal line developed from anterior ocellus to supraclypeal area, forming low but distinct carina. Inner orbits broadly roundly emarginate (Fig. 1). Antenna very short, reaching only middle of scutum; length/diameter ratios of flagellomeres: 1st – 0.55, 2nd – 0.78,

3rd – 0.80, 5th – 1.0, 6th – 0.9 (Figs 3, 4). Pronotal lateral ridges well developed, laminate, mesally not projecting in front of scutum. Anterior extremity of scutum sharp and carinate, at middle moderately emarginate in dorsal view (Fig. 5). Scutellum flattened, lying on the same plane as dorsal surface of propodeum. Dorsal surface of propodeum (measured in middle) 1.17 times as long as scutellum (Fig. 6); its median part represented by metapostnotum flat; its lat-

eral parts sharply inclined, forming with median part a distinct angle of 120°; its posterior margin bow-shaped (Fig. 6). Posterior vertical surface of propodeum nearly hexahedral (Fig. 7); its lateral and upper margins edged by strong carina, forming rounded projection on each side of midline on upper margin and triangular projection at boundary between dorsal and lateral surfaces of propodeum. Hind tibiae broadly concave on inner margin. Length/width ratios of metatarsal segments: 1st – 4, 2nd – 1.0, 3rd – 1.4, 4th – 1.5. Marginal cell of forewings sharply pointed. Postgradular area of metasomal terga 2-4 distinctly convex. Posterior marginal area of terga moderately broadened, flattened, not defined medially. Pygidial plate broadened, well defined laterally and posteriorly.

Metasomal sterna and genitalia. Sternum 2 with weak and rounded, sternum 3 with sharper and triangular depression on each side of midline on postgradular area; posterior marginal area of both with dense brush of whitish, short, greatly plumose hairs. Sternum 4 much shortened, hidden by sternum 3; its posterior margin with two erect thick setae on each side of midline (right lateral seta much reduced); sternal apodeme obtuse at anterior angle and acute at lateral angle, gradulus forming great loop laterally (Figs 8, 9). Sternum 5 flattened, with broad rounded emargination at posterior margin; its apodeme rounded (Fig. 10). Sternum 6 with weak longitudinal groove, gradually obliterated anteriorly; its apodeme with acute both anterior and lateral angles (Fig. 11). Sterna 7 and 8 much reduced, membranous, hairless, without posterior process or lobe; apodeme of sternum 7 rounded laterally; apodeme of sternum 8 directed antero-laterad (Fig. 12). Genital capsule broad; gonobase small; genital foramen transversely elliptic; ventral gonobasal arms broadened. Gonostyle double; its both lobes long, subequal; dorsal lobe at distal end ventrally bearing rhomboidal plate covered with dense, very fine hairs. Retorse membranous lobe itself bilobed, one part extending postero-laterad, the other antero-mesad; the lobe elongately-rhomboidal in ventral view, covered with hairs only on posterior half (Fig. 13). Penis valve slender (Fig. 14).

Sculpture. Face dull, granulate, with indistinct obscure reticulation. Vertex silk-dull, finely obscurely roughened. Genal areas shiny, indistinctly sparsely punctate. Scutum and scutellum dull, ruguloso-reticulate with

cells 25-40 μm ; bottoms of cells finely granulate; reticulation becoming indistinct on scutum laterally of parapsidal lines. Mesepisterna weakly shiny, ruguloso-reticulate. Metepisterna silk-dull, with striae directed along body. Dorsal surface of propodeum coarsely, sharply scabroso-reticulate (Fig. 6); its lateral surfaces dull, less distinctly reticulate; its posterior vertical surface silk-dull, with irregular rugulae and papilles. Metasomal terga silk-shiny, finely roughened, without distinct punctuation or granulation.

Coloration. Black, except of dark red apical half of mandibles, brown distal flagellomeres, brownish yellow tarsi and distal third of tibiae. Wing membranes hyaline, veins dark yellow, stigiae black, tegulae brownish translucent.

Vestiture. Pubescence of most surface of body whitish, relatively short and sparse. Pronotal lateral ridges and metanotum entirely, and anterior part of postgradular area of metasomal terga 2-6 covered with white dense tomentum; also scutum along anterior and posterior margins with traces of white tomentum.

Comparison. The male described above is similar to male of *P. reticulosus* (Dalla-Torre) in the structure of metasomal sterna 3-6 (cf. Fig. 1 in Blüthgen, 1928: 345). It differs from the latter in the convex vertex, structure of propodeum and hind tibia (protuberance on its inner surface absent).

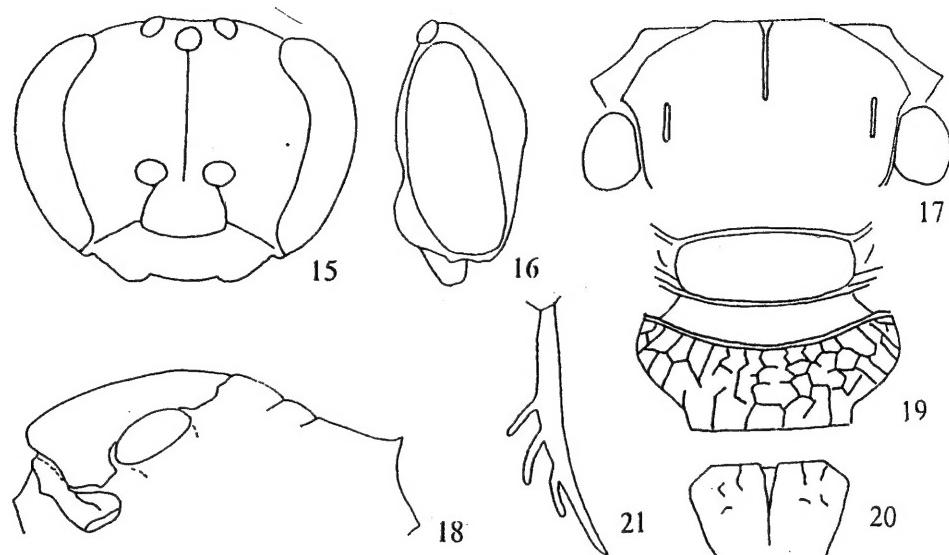
Distribution. North-eastern India, Thailand, Burma, Celebes, Java; new for China (Yunnan).

***Pachyhalictus (Pachyhalictus) trachynus* sp. n. (Figs 15-21)**

Holotype. ♀, China, Yunnan Prov., Xishuangbanna Distr., Mengxong, 750 m, 9.VI.1958, leg. Meng Shuwu [IZB].

Paratype. China, Yunnan Prov.: 1 ♀, Ganlanba, 700 m, 16.IV.1957, leg. Pu Fu-di [ZISP].

Description. Female. Structure. Length 6.5 mm. Head greatly flattened (Fig. 16), transversely elliptic in frontal view, with maximum width on level of upper third; its height/width ratio 0.78 (Fig. 15). Vertex almost flat; lateral ocelli lying immediately under line formed by upper margin of vertex. Malar space linear. Clypeus conspicuously convex, very short; its height (medially)/width ratio 0.27. Supraclypeal area convex. Frontal line developed from anterior ocellus to supraclypeal area, forming low but distinct carina. Inner orbits very broadly emarginate



Figs 15-21. *Pachyhalictus trachynus* sp. n., female. 15, head in frontal view; 16, head in lateral view; 17, pronotal ridges and scutum in dorsal view; 18, upper half of mesosoma in lateral view; 19, scutellum, metanotum and dorsal surface of propodeum; 20, posterior vertical surface of propodeum; 21, inner metatibial spur.

(Fig. 15). Pronotal lateral ridges well developed, laminate, mesally not projecting in front of scutum. Anterior extremity of scutum sharp, but without carina, straight in dorsal view (Fig. 17). Scutellum flattened, lying on the same plane as dorsal surface of propodeum (Fig. 18). Dorsal surface of propodeum 1.2 times as long as scutellum (Fig. 19), flat medially, gradually becoming weakly inclined laterally; its posterior margin straight. Posterior vertical surface of propodeum subtrapezoidal (Fig. 20); its lateral and especially upper margins edged by strong carina narrowly interrupted in the middle of upper margin. Inner metatibial spurs with three subequally long teeth (Fig. 21). Marginal cell of forewings sharply pointed. Postgradular area of metasomal terga flattened. Posterior marginal areas of terga 1-2 broadened, flattened, not defined medially.

Sculpture. Clypeus dull, with several indistinct, convergent downwards canalicules on lower part. Supraclypeal area, paraocular areas, and frons dull, indistinctly granulosopunctate. Vertex between and around ocelli silk-shiny, obscurely roughened. Genal areas shiny, obscurely punctate on upper part, almost smooth on lower part. Scutum and scutellum dull, uniformly ruguloso-reticulate with cells 50-80 μm ; only scutum laterally

along tegulae with elongate, obliquely directed cells. Mesepisterna moderately shiny, ruguloso-striate. Metepisterna dull, with several wrinkles directed along body. Propodeum dull; its dorsal surface very coarsely scabroso-reticulate (Fig. 19), this reticulation formed by very high, sharp carina-shaped wrinkles; its lateral surfaces ruguloso-reticulate; posterior vertical surface sparsely papillate. Metasomal terga silk-dull, obscurely roughened.

Coloration. Black, except for dark brown distal flagellomeres on lower surface and last three tarsal segments. Metasomal tergum I with very slight blue tint. Wing membranes slightly brownish infuscated; tegulae, veins and stigmas brown.

Vestiture. Pronotal lateral ridges and metanotum throughout, and postgradular area of metasomal terga 2 (relatively narrowly, on anterior part), 3 and 4 (very broadly, almost to posterior marginal area) covered with very dense, bright orange-brownish yellow tomentum. This area of terga 2-and-3-behind-anterior-bands covered with inconspicuous, short, simple, inclined hairs; laterally with long, pale, plumose hairs. Pubescence laterally of longitudinal hairless zone of metasomal tergum 5 dark brown. Hairs on lateral surfaces of mesosoma, on trochanters, and of metasomal

scopa whitish, on other parts of body inconspicuous, sparse, light yellowish grey. Pubescence of outer surface of hind tibiae (in addition to dark thorn-shaped hairs) yellowish, on inner surface whitish.

Male unknown.

Diagnosis. In the key by Blüthgen (1926, 1931) the new species runs best to *P. vinctus* (Walker) from Sri Lanka. It can be distinguished from the latter by the larger body, uniformly roughened metasomal tergum 1, uniformly and more coarsely rugoso-reticulate scutum, longer propodeum, number of teeth on inner metatibial spurs only half that of *P. vinctus*.

***Pachyhalictus (Pachyhalictus) yunnanicus* sp. n.
(Figs 22-44)**

Holotype. ♀, China, Yunnan Prov., Xishuangbanna Distr., Mengzhe, 870 m, 4.IX.1958, leg. Wang Shu-yeng [IZB].

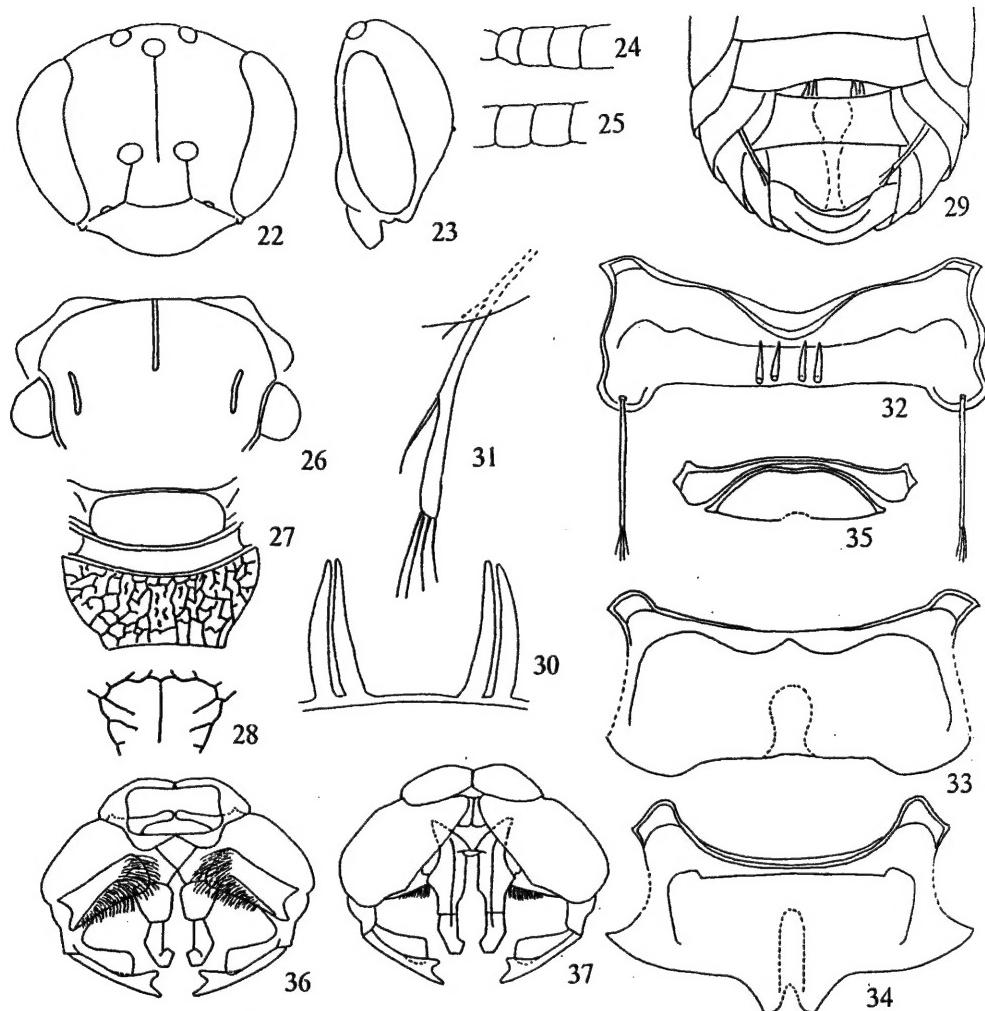
Paratypes. China, Yunnan Prov.: 1 ♀, Xishuangbanna Distr., Mengla, 620-650 m, 12.VII.1959, leg. Li Suo-fu [IZB]; 1 ♂, Puer, 1400 m, 3.IV.1955, leg. O. Kryzhanovsky [ZISP]; 1 ♀, 30 km SW Jingping, 500 m, 23.V.1956, leg. V. Panfilov [ZISP]; 1 ♀, Ganlanba, 700 m, 16.IV.1957, leg. Pu Fu-di [ZISP]; 2 ♀, Ganlanba, 570 m, 17.IV.1957, leg. Wang Shu-yeng [ZISP].

Description. Male. Structure. Length 5.5 mm. Head flattened (Fig. 23), triangularly elliptic in frontal view; its height/width ratio 0.83 (Fig. 22). Vertex convex; lateral ocelli lying immediately under line formed by upper margin of vertex. Malar space linear. Clypeus weakly convex; its height/width ratio 0.33. Supraclypeal area weakly convex, but greatly projecting above paraocular areas. Frontal line developed from anterior ocellus to supraclypeal area, forming low but distinct carina. Inner orbits weakly, broadly, roundly emarginate (Fig. 22). Antenna very short, reaching only middle of scutum; length/diameter ratios of flagellomeres: 1st - 0.67, 2nd - 0.70, 3rd - 0.80, 5-6th - 0.9 (Figs 24, 25). Pronotal lateral ridges moderately developed, mesally not projecting in front of scutum. Anterior extremity of scutum narrowly rounded, not carinate, straight in dorsal view (Fig. 26). Scutellum weakly convex, lying almost on the same plane as dorsal surface of propodeum. Dorsal surface of propodeum (measured in middle) 1.2 times as long as than scutellum, flat medially, gradually becoming inclined laterally; its posterior margin weakly concave (Fig. 27). Posterior vertical surface of propodeum roundly trapezoidal

(Fig. 28); its lateral and upper margins edged by sharp carina higher at dorso-lateral angles. Hind tibiae broadly concave on inner margin. Length/width ratios of metatarsal segments: 1st - 4.5, 2nd - 1.2, 3rd - 1.6, 4th - 1.7. Marginal cell of forewings sharply pointed. Postgradular area of metasomal terga 2-4 distinctly convex. Posterior marginal area of terga flattened, broadened, defined along whole anterior margin. Pygidial plate relatively small, well defined laterally and posteriorly.

Metasomal sterna and genitalia. Sterna 2 and 3 flattened; their posterior marginal areas with dense brush of whitish, greatly plumeous hairs. Sternum 4 much shortened, hidden by sternum 3; its posterior margin with two erect thick setae on each side of midline (Figs 29, 30) and with lateral giant seta directed backwards (Figs 29, 31); its apodeme with roundly obtuse anterior angle and acute lateral angle; gradulus forming weak loop laterally (Fig. 32). Sternum 5 with roundish depression; its posterior margin weakly emarginate; its apodeme with acute lateral angle (Fig. 33). Sternum 6 longitudinally concave, resembling an impression of gable roof; its apodeme with broadly rounded anterior extremity and acute lateral angle (Fig. 34). Sterna 7 and 8 much reduced, membranous, hairless, without posterior process or lobe; apodeme of sternum 7 with acute both anterior and lateral angles; apodeme of sternum 8 directed laterad (Fig. 35). Genital capsule broad; gonobase small, genital foramen nearly rectangular; ventral gonobasal arms broadened. Gonostyle long, double; its dorsal lobe membranous, longer than ventral one. Retorse membranous lobe itself bilobed, one part extending postero-laterad, the other antero-mesad; the lobe elongate, nearly rectangular in ventral view, covered with hairs on inner surface and anterior part (Fig. 36). Penis valve relatively slender; its apodeme unusually thick and short (Fig. 37).

Sculpture. Clypeus weakly shiny, indistinctly foveolate. Supraclypeal area dull, finely granulate. Frons dull, granulate and obscurely reticulate. Vertex-silk-dull, finely shagreened. Genal areas shiny, obscurely punctate. Scutum dull, obscurely ruguloso-reticulate, on anterior fifth of middle part more distinctly and coarsely reticulate with cells 30-40 μm . Scutellum dull, roughened and obscurely longitudinally strigose. Mes- and metepisterna silk-shiny, with wrinkles



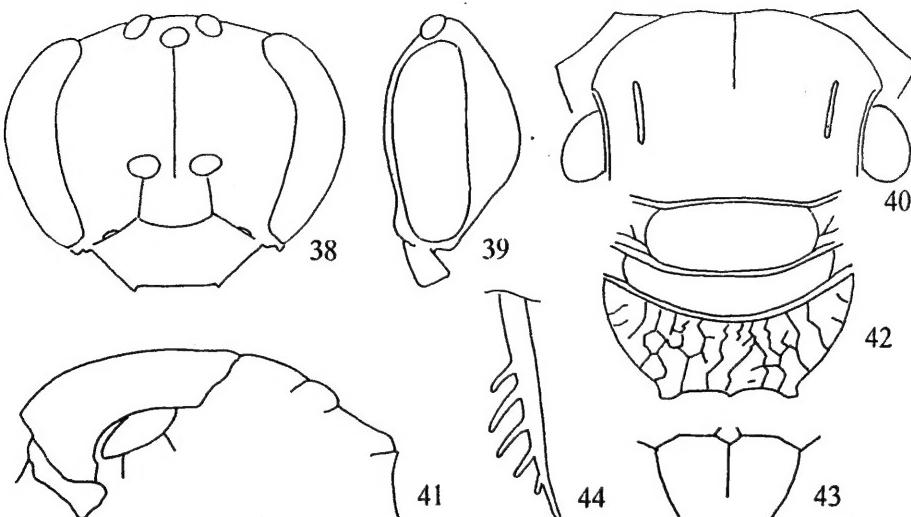
Figs 22-37. *Pachyhalictus yunnanicus* sp. n., male. 22, head in frontal view; 23, head in lateral view; 24, flagellomeres 1-3; 25, flagellomeres 5 and 6; 26, pronotal ridges and scutum in dorsal view; 27, scutellum, metanotum and dorsal surface of propodeum; 28, posterior vertical surface of propodeum; 29, metasoma in ventral view; 30, median setae of metasomal sternum 4; 31, giant (lateral) seta of sternum 4; 32, metasomal sternum 4; 33, sternum 5; 34, sternum 6; 35, sterna 7 and 8; 36, genital capsule in ventral view; 37, genital capsule in dorsal view.

directed along body. Propodeum dull; its dorsal surface scabroso-reticulate with trend to longitudinal wrinkles; its lateral surfaces roughened and obscurely strigose; its posterior vertical surface roughened, with several wrinkles directed mesad. Metasomal terga shiny; tergum 1 smooth, polished; subsequent terga sparsely and very obscurely punctate and roughened.

Coloration. Black, except for dark red apex of mandibles and brownish tarsomeres 2-5. Wing membranes hyaline; veins brown-

ish yellow; stigmae brown; tegulae brownish translucent.

Vestiture. Pubescence on upper part of genal area, mes- and metepisterna whitish, not dense, moderately plumose. Metanotum covered with not dense, white tomentum. Pronotal lateral ridges and lateral surface of propodeum with only traces of such pubescence. Labral and pygidial fimbriae brownish black. Metasomal terga 2-4 with white anterior bands narrowed and interrupted medially.



Figs 38-44. *Pachyhalictus yunnanicus* sp. n., female. 38, head in frontal view; 39, head in lateral view; 40, pronotal ridges and scutum in dorsal view; 41, upper half of mesosoma in lateral view; 42, scutellum, metanotum and dorsal surface of propodeum; 43, posterior vertical surface of propodeum; 44, inner metatibial spur.

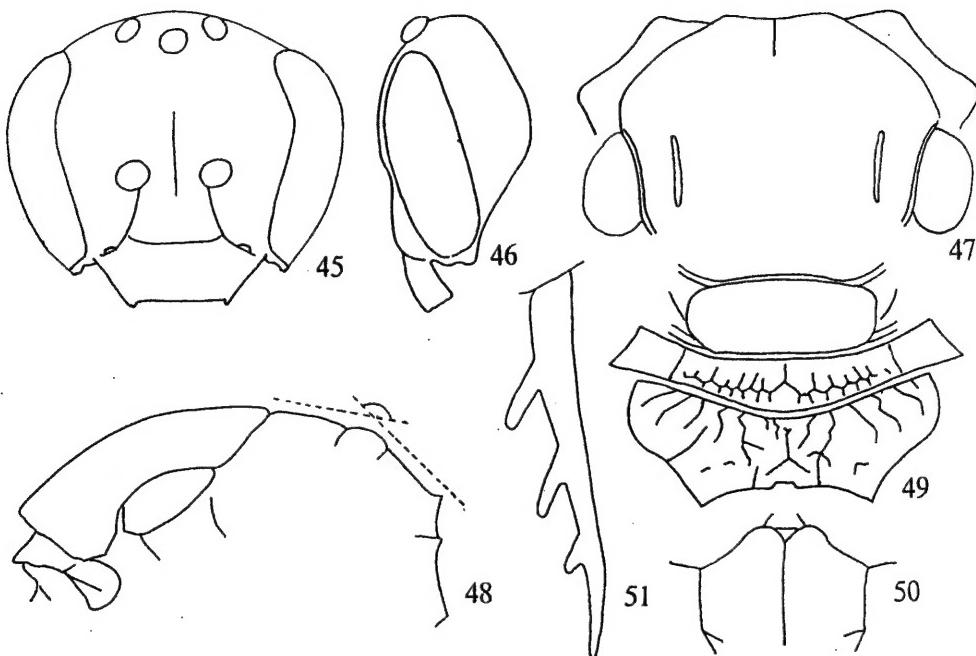
Female. Structure. Length 6.3-6.5 mm. Head flattened (Fig. 39), transversely elliptic in frontal view; its height/width ratio 0.83 (Fig. 38). Structure of face similar to that of male, except for less convex vertex. Height/width ratio of clypeus 0.33. Structure of mesosoma as that in male, except for dorsal surface of propodeum very slightly inclined laterally. Inner metatibial spurs with five teeth, middle ones longest (Fig. 44). Marginal cell of forewings sharply pointed. Postgradular area of metasomal terga 2-4 very slightly convex medially. Posterior marginal area of terga flat, broad, not defined medially.

Sculpture. Sculpture on face similar to that in male, except for clypeus dull, with indistinct, convergent downwards canalicules. Scutum dull, ruguloso-reticulate on posterior two-thirds between parapsidal lines, with cells 40-50 μm ; laterally, along parapsidal lines obscurely reticulate; along tegulae roughened, without conspicuous reticulation; on anterior third with reticulation having a distinct tendency to form transverse grooves. Scutellum dull, with obscure, irregular and indistinct reticulation, but forming cells 2-3 times larger than on scutum. Mesepisterna ruguloso-reticulate on anterior part; their posterior part and metepisterna silk-dull, with wrinkles directed along body.

Propodeum dull; its dorsal surface sparsely and very coarsely scabroso-reticulate (Fig. 42), this reticulation consisting mostly of not closed cells formed by high and sharp cariva-shaped wrinkles; its lateral surfaces shagreened, with several wrinkles and papillae; its posterior vertical surface shagreened. Metasomal terga shiny. Tergum 1 smooth, polished; its posterior marginal area sparsely and very finely punctate: punctures 7-10 μm separated by 3-7 times of their diameters, not punctate in middle. Terga 2 and 3 very sparsely punctate (10-15 μm) on postgradular area; their posterior marginal area obscurely, finely and sparsely punctate.

Coloration. As in male, except three last flagellomeres brown.

Vestiture. Pubescence on face, scutum and scutellum erect, short, not dense, slightly plumose, light yellowish grey to brownish. Pubescence of genal area, mes- and metepisterna, trochanters, femora and metasomal sterna erect, white, long, plumose. Pronotal lateral ridges, metanotum and anterior half to two-thirds of postgradular area of metasomal terga 2-4 covered with dense, whitish yellow to brownish yellow tomentum. Postgradular area of terga behind anterior bands with long, inclined, sparse, but very conspicuous simple dark hairs; laterally with long dense whitish hairs. Pubescence



Figs 45-51. *Pachyhalictus lioscutalis* sp. n., female. 45, head in frontal view; 46, head in lateral view; 47, pronotal ridges and scutum in dorsal view; 48, upper half of mesosoma in lateral view; 49, scutellum, metanotum and dorsal surface of propodeum; 50, posterior vertical surface of propodeum; 51, inner metatibial spur.

laterally of longitudinal hairless zone of terga 5 goldish brown to dark brown.

Diagnosis. The female of the new species runs best to *P. pseudothoracicus* (Blüthgen) from Sumatra in the key by Blüthgen (1926, 1931). It can be distinguished from the latter by the sculpture of the scutum, sculpture and vestiture of metasomal terga 2-4. The male of *P. yunnanicus* is similar to the only male of subgenus *Pachyhalictus* whose genitalia were described ("*Halictus* sp. γ" by Blüthgen; see Michener, 1978: Figs. 54-59) in having a giant seta (term by Michener) at the postero-lateral extremities of metasomal sternum 4.

Pachyhalictus (Pachyhalictus) lioscutalis sp. n. (Figs 45-51)

Holotype. ♀, China, Yunnan Prov., Xishuangbanna Distr., Mengzhe, 870 m, 7.IX.1958, leg. Wang Shuyeng [IZB].

Paratypes. China: Yunnan Prov.: 1 ♀, 30 km SW Jingping, 12.IV.1956, leg. Huan Ke-ren [ZISP]; 1 ♀, Xiaomengyang, 30.III.1957, leg. Zan Lingshao [ZISP]; Fujian Prov., 1 ♀, Jianyang, 28.III.1960, leg. Ma Chen-lin [ZISP]; 1 ♀, same locality, 11. IV.1960, leg. Zhang Yi-ren [IZB].

Description. Female. Structure. Length 7.2-7.6 mm. Head moderately flattened (Fig. 46), rounded in frontal view; its height/width ratio 0.85-0.88 (Fig. 45). Vertex convex, with weak callosity laterally; lateral ocelli lying immediately under line formed by upper margin of vertex. Malar space linear. Clypeus convex; its height (medially)/width ratio 0.45. Supraclypeal area strongly convex. Frontal line developed only on lower half to two-thirds of frons, forming distinct carina. Inner orbits broadly and weakly emarginate (Fig. 45). Pronotal lateral ridges well developed, laminate, mesally not projecting in front of scutum. Anterior extremity of scutum narrowly rounded, nearly straight in dorsal view (Fig. 47). Scutellum slightly convex, forming an angle of 140° with dorsal surface of propodeum (Fig. 48). Dorsal surface of propodeum (measured in middle) as long as scutellum (Fig. 49), flat medially, gradually becoming steeply inclined at postero-lateral parts; its posterior margin concave. Posterior vertical surface of propodeum nearly hexahedral (Fig. 50); its lateral and upper margins edged by a strong carina forming a loop on each side of midline on upper margin. Inner metatibial

spurs with three relatively short teeth (Fig. 51). Marginal cell of forewings narrowly rounded at distal end. Postgradular area of metasomal terga flattened. Posterior marginal areas of terga 1-2 broadened, flattened, not defined medially.

Sculpture. Clypeus on lower half shiny, smooth, with several punctures 30-40 µm, on upper half dull, finely granulate, with punctures 15-25 µm separated by 0.3-1.5 times of their diameters. Supraclypeal area at centre shiny, on other parts dull, finely granulate and obscurely punctate. Frons dull, very finely granulate and indistinctly irregularly punctate. Vertex shiny, with sparse punctures 10-15 µm. Genal areas near vertex shiny, nearly smooth; on most surface silk-shiny, densely longitudinally striate. Scutum and scutellum silk-shiny, entirely uniformly, very finely and very superficially granulate (each granula about 0.5 eye facet), also with superficial foveae 30-40 µm separated by 3-5 times of their diameters. Mesepisterna rugoso-reticulate, on lower part longitudinally canalicate. Metepisterna dull, finely granulate, on upper third with several wrinkles directed along body. Dorsal surface of propodeum dull, along anterior margin and medially with sparse, strong, curved and poorly branched carinae (at centre with carina in form of triangular star; Fig. 49); its postero-lateral parts as well as lateral surfaces of propodeum not carinate, only finely granulate. Posterior vertical surface of propodeum indistinctly sparsely punctate and papillate. Sculpture of metasomal terga similar to that of scutum, but punctures 10-15 µm.

Coloration. Black, except for brownish to reddish apex of mandibles, brown flagellomeres on lower surface and tarsi. Wing membranes very slightly infuscated; tegulae, veins and stigiae brown.

Vestiture. Pronotal lateral ridges covered with very dense yellowish tomentum. Metanotum and posterior vertical surface of propodeum with whitish, sparse, fine tomentum. Only metasomal terga 2 and 3 with white anterior bands very narrowed and broadly interrupted medially. Labral fimbria and pubescence laterally of longitudinal

hairless zone of metasomal tergum 5 dark brown. Pubescence of outer surface of hind tibiae entirely consisting of dark thorn-shaped hairs, on inner surface usual, whitish.

Male unknown.

Diagnosis. In the key by Blüthgen (1926, 1931) the new species runs best to *P. buruanus* (Blüthgen) from Buru Island (Indonesia). It differs from the latter in the sparse punctuation and scanty pubescence of metasomal tergum 1 and very sparsely punctate (not papillate) anterior half of scutum.

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